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BUREAU OF ENTOMOLOGY.

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INSECT INJURIES TO THE WOOD OF LIVING TREES.<sup>a</sup>

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It has been determined that insects of a certain class attack the wood and bark of living timber and that, while they do not contribute materially to the death of the trees or give much external evidence of their presence, they produce wounds in the bark and wormhole and pinhole defects in the wood which result in a depreciation in commercial value amounting to from 5 to 50 per cent. These defects in the wood are not detected until after the trees have been felled and the logs transported to the mill and converted into lumber. Thus to the actual damage to the lumber is added the expense of logging and manufacture of the defective, low-grade material, much of which must be discarded as worthless culls.

*The oak timber worm.*—One of the most destructive of the class of depredators just mentioned is the oak timber worm. It enters the wood of the trunks of living trees through wounds in the bark and at the base of broken or dead branches and extends its "pinhole" burrows in all directions through the solid heartwood. The losses occasioned by this insect in the hardwood forests of the eastern United States are enormous and usually affect the wood of the finest examples of old trees.

*The chestnut timber worm.*—The chestnut throughout its range is damaged in a like manner by the chestnut timber worm. Practically every tree of merchantable size is more or less affected, and a large percentage is so seriously damaged that the product is reduced to that of the lowest grade. It is estimated that the reduction in value of the average lumber product at any given time is not far from 30 per cent,

<sup>a</sup> Revised extracts from Bulletin No. 58, Part V, Bureau of Entomology, U. S. Department of Agriculture. 1909.

thus involving extensive waste and an increased drain on the forest to supply clear lumber. This insect also attacks the oaks, and especially the red oak, the older trees of which are often as seriously damaged as are the chestnut.

*Carpenter worms.*—The oaks, especially the white oak and the red oak, are seriously damaged by carpenter worms of the genus *Prionoxystus*. The holes made by these insects through the heartwood of the best part of the trunks are sometimes 1.5 inches in diameter one way by 0.75 inch the other, thus causing serious damage to the wood. These, with other large wood-boring beetle larvæ, sometimes infest the top part of the trunk and the larger branches of oak trees, where their continued work results first in the dead and so-called “stag-horn” top and subsequently in broken, decayed, and worthless trunks.

*Ambrosia beetles.*—One of the commonest defects in white oak, rock oak, beech, whitewood or yellow poplar, elm, etc., is that known to the lumber trade as “grease spots,” “patch worm,” and “black holes.” This defect is caused by one of the timber beetles or ambrosia beetles, which makes successive attacks in the living healthy sapwood from the time the trees are 20 or 30 years old until they reach the maximum age. Thus the black-hole and stained-wood defect is scattered all through the wood of the best part of the trunks of the trees. The average reduction in value of otherwise best-grade lumber amounts, in many localities, to from 25 to 75 per cent. The defect is commonly found in oak and elm furniture and in interior hardwood finish in dwellings and other buildings.

*The locust borer.*—The locust, as is well known, suffers to such an extent from the ravages of the locust borer that in many localities the trees are rendered worthless for commercial purposes or they are reduced in value below the point of profitable growth as a forest tree; otherwise this would be one of the most profitable trees in the natural forest or artificial plantation and would contribute greatly to an increased timber supply.

*Turpentine beetles and turpentine borers.*—While the softwood trees, or conifers, suffer far less than the hardwoods from the class of enemies which cause defects in the living timber, there are a few notable examples of serious damage. There is a common trouble affecting the various species of pine throughout the country known as basal wounds or basal fire wounds. It has been found that a large percentage of this injury to the pine in the States north and west of the Gulf States and in the Middle and South Atlantic States is caused by the red turpentine beetle and in the Southern States by the black turpentine beetle. These beetles attack the healthy living bark at and toward the base of the trunks of medium to large trees and kill areas varying in size from 1 to 10 square feet. These dead

areas are subsequently burned off by surface fires and are then generally referred to as fire wounds. The further damage to the exposed wood by successive fires, decay, and insects often results in a total loss of the best portion of the tree, or a reduction in value of the lower section of the trunk of from 10 to 50 per cent. These and similar wounds in the bark of trees, including those caused by lightning and by the uncovering and exposure of the wood in turpentineing, offer favorable conditions for the attack of the turpentine borer, the work of which, together with that of two or three others with similar habits, is very extensive, and causes losses amounting to from 10 to 50 per cent of the value of the wood of the best part of the trees thus affected.

*The white pine weevil.*—The abnormal development of white pine trees as the result of successive attacks on the terminals of the saplings and young trees by the white pine weevil is an element of loss of considerable importance, especially in mixed stands and in open pure stands of this timber. The value of such trees is reduced from 20 to 50 per cent below those of normal development, and there is an additional loss from the effect of their spreading branches or crowns in the suppression or crowding out of trees which would otherwise occupy the space thus usurped.

There are many other examples of insects which damage the wood and bark of living trees, but those mentioned should be sufficient to demonstrate the importance of insects in this relation.

#### CONTROL OF INSECTS WHICH CAUSE DEFECTS IN LIVING TIMBER.<sup>a</sup>

The class of insects which cause defects in the wood of living timber can be controlled to a greater or less extent, depending upon local conditions, and a large percentage of the losses prevented through the adoption of certain requisite details in forest management, among which the following are especially important:

(1) The utilization of all of the defective and infested timber that will pay expenses for manufacture into merchantable products, such as lumber, cordwood, etc.

(2) The burning of infested timber and waste material not available for use, including dead standing and fallen timber, to remove the breeding places of insects like the oak timber worm and the chestnut timber worm, which go from the dead to the living timber.

(3) The prevention of wounds of any kind in the bark of living trees.

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<sup>a</sup> For methods of controlling the locust borer and white pine weevil, see Circulars 83 and 90, respectively, of the Bureau of Entomology, U. S. Department of Agriculture.

(4) The prevention of future losses by the practice of improved forestry methods to eliminate favorable conditions for injury and contribute to a perpetual supply of vigorous, healthy timber to be utilized before it passes the stage of profitable increment.

It should be remembered that the different species of insects which cause defects in the wood of living timber require different details in the methods of control, and that special cases, special local conditions, and details in business methods and requirements determine which one of the available methods should be adopted.

It should also be remembered that in the more important cases much loss of time and money may be prevented and the best success attained by first securing some authoritative advice on the insects involved and the specific requirements for the control work.

Approved:

JAMES WILSON,

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